Thermo Scientific Piko Thermal Cycler

User Manual

Rev. 1.1

Part of Thermo Fisher Scientific

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Thermo Scientific Piko Thermal Cycler

User Manual

Rev. 1.1, Cat. no. N11469

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Warranty
Finnzymes Instruments Oy warrants that the Piko® Thermal Cycler is free from defects in materials and workmanship for 2 years from the date of purchase. Defects that are covered by this warranty and that occur during this warranty period will be repaired, or the system will be replaced, free of charge and at the sole discretion of Finnzymes Instruments Oy or its licensed distributors. Repairs that occur outside this warranty period will be charged for parts, labor and shipping. Fulfillment of warranty obligations is the responsibility of the company that sold the Piko Thermal Cycler. For specific information regarding warranty coverage please contact said company directly.
This warranty shall not apply to any of the following:

1. Defects caused by repairs or modifications made by anyone other than Finnzymes Instruments Oy or its licensed distributors.
2. Defects caused by improper packaging of returned goods. If necessary, please contact the company that sold the Piko Thermal Cycler to receive new shipping materials prior to shipment and instructions for proper shipment.
3. Defects caused by use of improper materials, including tubes, plates or sealers not designed and approved for the Piko Thermal Cycler, or solvents and agents (such as radioactivity or biohazardous agents) not approved for use or allowable for public shipment.
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No liability for consequential damages
Thermo Fisher Scientific shall not be liable for any damages whatsoever arising out of the use or inability to use this product.

About This User Manual

Intended users

The Piko Thermal Cycler can be used in research and routine-test laboratories by professional personnel.

How to use this user manual

This user manual is for the following instruments, Piko Thermal Cycler, 24-well (Cat. no. TCP0024) and Piko Thermal Cycler, 96-well (Cat. no. TCP0096). It has been designed to give you the information you need to:

- Review safety precautions
- Install the Piko Thermal Cycler
- Operate the instrument
- Adjust the settings and service the instrument
- Troubleshoot the instrument performance

This user manual also describes all the features and specifications of the Piko instrument.

Read the manual in its entirety before operating the instrument.

Bolded words refer to items or functions that may be selected from the programming menu or from the keypad of the instrument. The following is an example for initiating a protocol: “To run a protocol, first select **RUN** using the function key.”

The following is an example referring to the “Open” button on the keypad: “Press **OPEN** to disengage the heated lid, and release the block along the sliding rails of the Piko Thermal Cycler.”

Keep the user manual for future reference. The user manual is an important part of the instrument and should be readily available during use of the instrument. Keep the user manual together with the instrument in case you distribute it onwards.

For more information

For the latest information on products and services, visit our websites at:

`http://www.thermoscientific.com/piko`

In our efforts to produce useful and appropriate documentation, we would appreciate any comments you may have on this user manual for your local Thermo Fisher Scientific representative.

Safety instructions

Read the User Manual Operating the Piko Thermal Cycler without first reading the entire User Manual may constitute a risk to your health. Only a person capable of handling electrical equipment should use the Piko Thermal Cycler. NOT FOR CHILDREN. ▲

Do Not Attempt to Repair Do not remove the cover of the system. Do not try to repair or replace broken components – you put yourself at risk for electrical shock. Removing the cover or replacing/removing components will void the warranty. Contact customer service or your local distributor if your system is not functioning properly. ▲

Do Not Touch the Sample Block Certain components, including the sample block and heated lid, will become excessively hot. Touching these components may cause burns. ▲

Do Not Tamper with Electronics Coming in contact with the electronics, even when the system is off or unplugged, may cause an electrical shock or harm. ▲

Do Not Use Flammable or Hazardous Liquids with the Piko Thermal Cycler ▲

Safety warnings

These symbols are intended to draw your attention to particularly important information and alert you to the presence of hazards as indicated.

Caution This symbol indicates risk of harm or personal injury. Always consult the User Manual before touching the area of the Piko Thermal Cycler that displays this symbol. ▲

Caution This symbol indicates a risk of personal injury or harm by electrical shock. Always consult the User Manual before touching the area of the Piko Thermal Cycler that displays this symbol. ▲

Caution This symbol indicates risk of personal injury or burn by contact with a very hot surface. Avoid touching such surfaces. ▲

WEEE symbol This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. ▲

Note Marks a hint, important information that is useful in the optimum operation of the system, or an item of interest. ▲

Electromagnetic interference

This product conforms to the "Class B" standards for electromagnetic emissions intended for laboratory equipment applications. It is possible that emissions from this product may interfere with some sensitive appliances when placed nearby or in the same circuit as these appliances. The user should be aware of this potential risk and take appropriate measures to avoid interference.

Environmental requirements

This section describes the environmental requirements of the Piko Thermal Cycler.

Note Important! It is highly recommended that all users of the Piko Thermal Cycler read the following section carefully. The performance and reliability of the Piko Thermal Cycler are closely linked to the working conditions in which the system is run. To ensure that your Piko Thermal Cycler will provide years of top-level performance and have the fewest problems, adhere to the environmental requirements described here. ▲

Absolute environmental requirements

The Piko Thermal Cycler is rated to operate reliably in the following environmental conditions. Avoid extremes of these environmental ranges to best preserve the long-term performance and life span of the instrument.

- Ambient temperature: 5°C–30°C
- Ambient relative humidity: up to 80%
- Altitude: under 2000 m
- Indoor use only

Recommended working conditions

The Piko Thermal Cycler will perform optimally and with greater reliability in the following operating conditions.

- Ambient temperature: 15°C–25°C
- Ambient relative humidity: under 50%
- Altitude: under 1000 m

Airflow

Airflow is paramount to high-speed performance and reliability. It is important to maintain good heat sink cooling capability. It is best to have a cool source of incoming air and an unobstructed exhaust for outgoing air. Follow these three guidelines to best ensure optimum heat sink function:

- **Obstruction-free intake of air** – Do not place on a hot surface or on laboratory bench paper. Do not slide any paper or other material under the system as this may hamper the airflow or be sucked into the system.
- **Obstruction-free exhaust for outgoing air** – Always keep a distance of at least 10 cm between the exhaust vents and any large solid object such as walls, larger instruments, or other thermal cyclers. Do not have other instruments exhaust blowing directly at the Piko Thermal Cycler system.
- **Clean fins of heat sink** – Inspect the fins of the heat sink on a regular basis. Dirty heat sinks have a significantly lower capacity to dissipate heat. Clean the fins if they become dirty or covered in dust. You can use a cotton swab, a brush, or compressed air to remove dust.

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Chapter 1
Piko® Thermal Cycler Overview

The Piko Thermal Cycler (Figure 1-1) delivers high performance in a compact package. It incorporates novel technical solutions that allow significant reductions in PCR run times and the overall size of the instrument. The Piko Thermal Cycler is an ideal solution for both conventional and fast PCR applications. The Piko Thermal Cyclers are available in two different block configurations: 24-well and 96-well.

Figure 1-1. Piko Thermal Cycler

Chapter 2
Piko Thermal Cycler Main Parts

This chapter describes the main parts of the Piko Thermal Cycler.

Front view

The front view of the Piko Thermal Cycler is shown in Figure 2–2.

Figure 2–2. Piko Thermal Cycler front view

Rear view

The rear view of the Piko Thermal Cycler is shown in Figure 2–3.

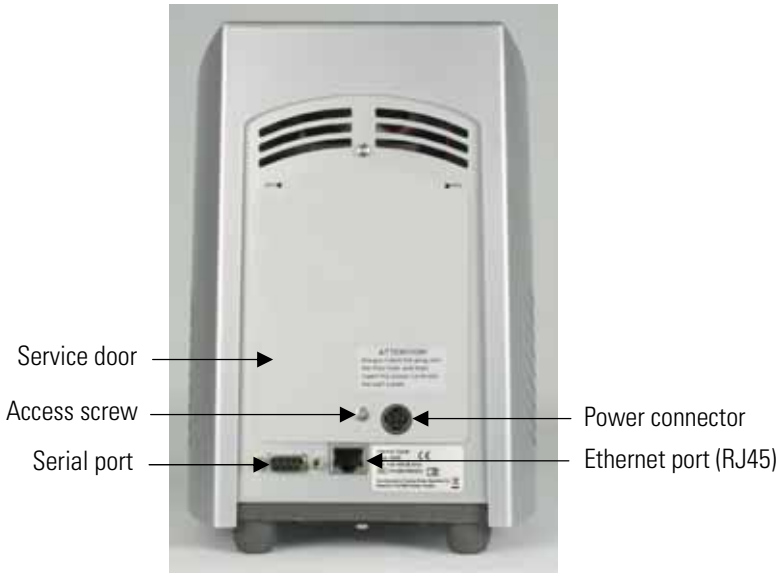


Figure 2–3. Piko Thermal Cycler rear view

Instrument user interface

The user interface of the Piko Thermal Cycler is shown in Figure 2–4.

Figure 2–4. Piko Thermal Cycler instrument user interface

Main menu

The Piko Thermal Cycler user interface features four function keys which are used to select different menu options.

The function keys on the **Main** menu have the following actions:

[F1] RUN Runs saved protocols. Allows editing of saved protocols.

[F2] NEW Begins programming of a new protocol.

[F3] STAT Shows Status screen (when running).

[F4] TOOLS Accesses global settings or diagnostic routines.

[C] The red button with a "C" is the **CANCEL** button. It will bring you back to the **Main** menu. If you are performing a run, and press the **C** button for more than a second, it will cancel the run. In certain cases, for example, when saving a file, the button takes you back one screen.

LED function

To the left side of the power button on the keypad are two LEDs with the following indications:

Constant blue	System on and NOT in use.
Blinking blue	System on and in use.
Constant red	System has recently experienced an error. Refer to Chapter: "*Troubleshooting Guide*" for more information.

Automatic lid

The heated lid is internally motor-controlled. It will automatically adjust to the optimal temperature and sealing pressure.

External power supply

The Piko Thermal Cycler uses an external 180 watt power supply (an approach commonly used with lap-top computers). This is made possible by the instrument's unusually low power consumption. In countries with a low-voltage power grid, the Piko Thermal Cycler uses a 200 watt power supply.

Vessels compatible with Piko Thermal Cycler

The Piko Thermal Cycler sample blocks (24-well and 96-well) will only accept microplates with a footprint in the dimension of a microscope slide. This Piko format gives the Piko Thermal Cycler its compactness as well as its ability to deliver excellent performance.

However, note that some other low profile thin-wall PCR tubes are also compatible with the 24-well Piko Thermal Cycler. For a complete listing of product numbers and additional product information, visit our website at `www.thermoscientific.com/piko`.

UTW® Ultra-thin wall vessels provided by Thermo Fisher Scientific are recommended. These vessels were used in the optimization of the temperature algorithms of the instrument as well as in the validation of its performance. UTW vessels provide more consistent results in fast PCR protocols.

Note Conventional format microplates will not fit within the Piko Thermal Cycler. ▲

Block formats

The Piko Thermal Cycler is available in two block formats (Figure 2–5 and Figure 2–6).

Figure 2–5. 24-well, max. volume 50 µl

Figure 2–6. 96-well, max. volume 20 µl

Chapter 3
Installation

This chapter describes the installation and setup of the Piko Thermal Cycler.

Items included

Inside the Piko Thermal Cycler package you should find the following:

- Piko Thermal Cycler
- Power supply
- CD-ROM with User Manual and Piko Studio Installer
- Quick Reference Guide
- Power cord

Setting up the Piko Thermal Cycler

Setting up the Piko Thermal Cycler can be performed in 5 simple steps:

1. Remove all components from packaging.
2. Install the Piko Thermal Cycler in a protected location where no one can step on or trip over the line cord, and where the line cord remains accessible in case of a need to unplug the unit.
3. Plug the power supply into the back of the Piko Thermal Cycler.
4. Insert the power cord into the power supply.
5. Insert the power cord into the outlet.

The system will power up automatically.

Caution To prevent risk of shock or damage to the instrument, it is very important that the power supply be first connected to the Piko Thermal Cycler before plugging it into the wall. ▲

Caution Always use a grounded outlet and cord to provide power to a Piko Thermal Cycler. ▲

Chapter 4
Operation

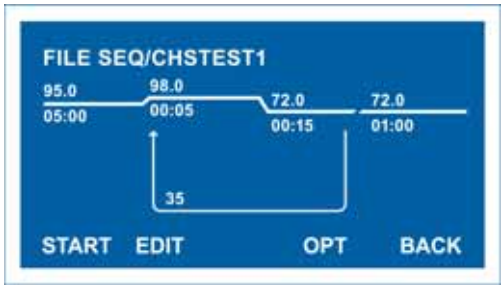
The operation of the Piko Thermal Cycler is described below.

Operating modes

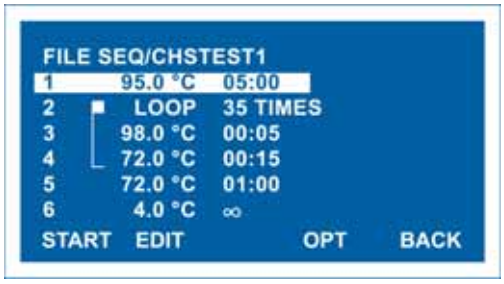
Programs can be edited either in a semigraphical mode or in a list mode.

You can change the mode by pressing the **TOGGLE** key at the lower left corner of the keypad. The mode remains until you change it again with the **TOGGLE** key. You can also change the mode when the instrument is running a protocol.

In the semigraphical mode the steps are displayed from left to right.



In the list mode the steps are in a numbered list.

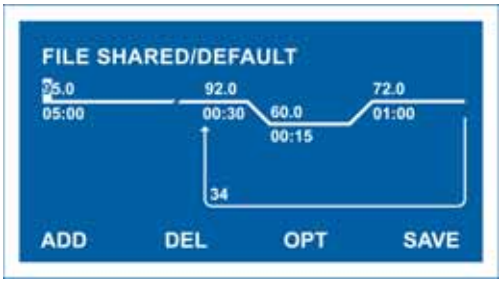


Note You cannot use the **TOGGLE** key when editing the time of a temperature step. It is used for changing the temperature step into an infinite hold. ▲

Creating a new protocol

To create a new protocol, press **NEW** in the **Main** menu.

A DEFAULT protocol is displayed on the screen.



The DEFAULT protocol is a typical PCR temperature cycling routine: A temperature step is represented by a horizontal line with a temperature value (with a resolution of 0.1, in °C) above the line, and a time value (in mm:ss) below the line.

The DEFAULT protocol is permanently stored in the SHARED folder. If changes are made and saved to this file and folder, the latest saved version of the DEFAULT protocol will appear each time a new protocol is selected.

Note You can toggle between the semigraphical mode and list mode by pressing the **TOGGLE** key from the keypad. ▲

Opening an existing protocol

To open an existing protocol:

1. From the **Main** menu press **RUN**.
2. Highlight the desired folder using the arrow keys.
3. Press **OPEN** to open the selected folder.
4. Highlight the desired protocol file using the arrow keys.
5. Press **OPEN** to open the selected protocol file.

This will display the protocol in semigraphical or list mode depending on which mode has most recently been used.

If you want to run the protocol, press **START**.

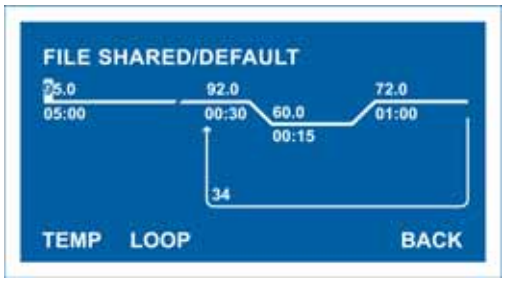
If you want to start editing the existing protocol, press **EDIT**.

Editing a protocol

This section describes how to edit a protocol.

Adding a temperature step

To add a temperature step:



1. In the protocol editing screen, add a new temperature to the right of the highlighted step by pressing **ADD** and then **TEMP**. You can delete a highlighted temperature step by pressing **DEL**.

2. Modify the temperature and time values by moving to the value field with the arrow keys and entering a new value using the keypad.

The decimal point will be added automatically. For a temperature of 60.5°C, enter the following: “6, 0, 5.” Similarly, for a time value, enter the numbers as you would write them: for a 1 minute and forty-five second hold, enter the following: “0, 1, 4, 5.”

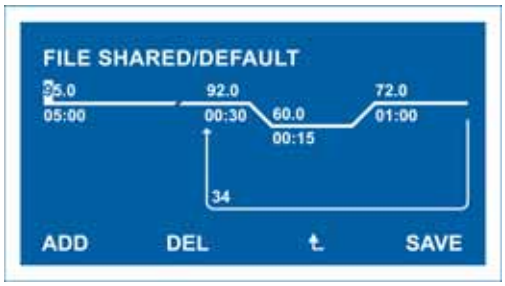
Adding a cycling loop

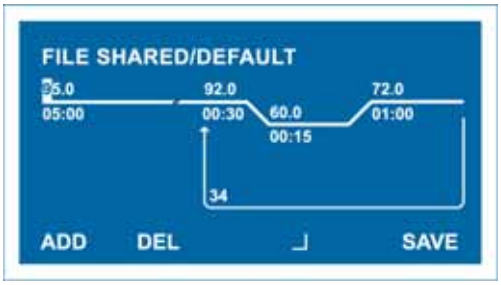
To add a cycling loop:

1. In the protocol editing screen, go to the last step of the desired loop and press **ADD**.

2. Press **LOOP**. The default loop has 3 steps and 35 cycles.

3. Move to the number of cycles value field in the left corner of the loop arrow, and change the number of cycles, if desired.





In the loop editing mode, the right and left arrow keys can be used to change the first or last step of the loop. The symbol above the **F3** key indicates whether the first step of the loop or the last step of the loop will be changed.

4. To toggle between these modes, press the **F3** key.

Entering advanced programming options

Add temperature increments, time extensions, and adjust the ramp rate according to the following instructions.

Note You can also edit temperature and time values in this screen. ▲

1. In the FILE SHARED/DEFAULT screen, press **OPT**.

2. If you want to add (or subtract) an increment to the temperature step in a loop, move to the **INC** field with the arrow key, and edit the value. The amount of the increment will be added to (or subtracted from) each successive cycle. This is used for touchdown protocols. The input range is (±) 0.1°C to 9.9°C/cycle.

3. If you want to add (or subtract) a defined time extension to a temperature step in a loop, move to the **EXT** field with the arrow key and edit the value. The amount of the extension is added to (or subtracted from) each successive cycle. The input range is (±) 1 to 99 seconds/cycle.

4. If you want to slow the ramp rate to a value below the maximum go to the **RAMP** field and edit the value. The input range is 0.1 to 7.0°C/second.

5. Accept the changes by pressing **OK**.

You can go back to the protocol editing screen without saving the changes by pressing **BACK**.

Note If advanced options have been entered, the **OPT** menu label will be reverse displayed (have a white background) when the affected step is highlighted. This is to remind you that an option has been programmed into that step. ▲

Deleting a cycling loop

1. In the protocol editing screen, go to any step in the loop.

2. Go to the number of cycles value in the loop arrow using the arrow keys, and press **DEL**.

The loop is deleted from the protocol.

Adding an infinite hold

When editing the time field of any temperature step, press the **TOGGLE** key at the lower left corner of the keypad to add an infinite hold.

Saving a protocol file

After editing a protocol file, save it according to the following instructions.

1. In the protocol editing screen, press **SAVE**.

Note If you do not want to save the changes, press the **C** button from the keypad. ▲

2. If you are saving a new protocol file, select the folder in which you wish to save the file and press **OPEN**.

Note If you are editing an existing protocol file, the file will be saved in the same folder as before, and you do not need to select the folder from the screen. If you wish to save the file to a new folder, press **BACK**, and select a folder or create a new one. ▲

If you want to create a new folder, in the SELECT FOLDER screen do as follows:

a. Press **NEW**.

b. Type the folder name (7 characters maximum).

c. Type your password (4 characters maximum).

The password is optional. A password protected folder will prevent unauthorized users from editing protocols within the folder, or from saving new protocols to the folder. Password protection does not prevent unauthorized users from viewing or running the protocols within the folder. If the **PASSWORD** field is left blank, the folder will not be password-protected.

Note If a password is lost or forgotten, contact Thermo Fisher Scientific tech support (finnzymes.techsupport@thermofisher.com) for instructions on how to reset the folder. ▲

d. Press **YES**.

e. In the SELECT FOLDER screen, press **OPEN** to open the new folder.

3. To save the protocol file with a new name, press **NEW**, type the file name, and press **YES**.

If you want to overwrite an existing file, select the file in the list and press **OPEN**.

4. Confirm by pressing **YES**.

The protocol file is saved and you will return to the **Main** menu.

Note If you select **YES&RUN**, make sure that the samples are already loaded at this point. The instrument asks for the volume and then starts running the protocol. ▲

Renaming or deleting an existing folder

You can rename or delete all other folders except the {RECENT} and the {SHARED} folder.

The {RECENT} folder stores the last six protocols that have been run on the Piko Thermal Cycler. The {SHARED} folder is a default folder that can be used and accessed by all users.

1. In the **Main** menu, press **RUN**.
2. Select a folder and press **MOD**.
3. If you want to rename the folder, select **RENAME** and type the new name. Password protected folders require a password to delete or rename a folder.

Note Text entry is similar to that of a cell phone. A number or character is automatically entered after a one second delay. Pressing the key will toggle through the assigned number and three characters (for example, press the key labelled [2, A,B,C] twice to select "A" and wait 1 second). A folder name can be a maximum of 7 characters long. ▲

4. If you want to delete an existing folder, press **DEL**.

Note Deleting a folder also deletes all the protocol files in it. ▲

5. Accept the changes by pressing **YES**.

Running a protocol

To run a protocol:

1. From the **Main** menu, press **RUN**.
2. Highlight the folder in which the protocol file has been saved, press **OPEN**.
3. Highlight the protocol file and press **OPEN**.

The protocol will be displayed in semigraphical or list mode depending on which mode has most recently been used. You can toggle between the modes by pressing the **TOGGLE** key at the lower left corner of the keypad.

4. Press **START**.

5. Enter the sample volume (µl per well).
   - 24-well Piko Thermal Cycler: 10–50 µl
   - 96-well Piko Thermal Cycler: 5–20 µl

Note If you are using a 96-well Piko Thermal Cycler, the run will start immediately after accepting by pressing **YES**. ▲

6. If you are using a 24-well Piko Thermal Cycler, select lid pressure based on consumables. Highlight the appropriate alternative and press **SELECT**.

Note If less than 16 x 0.2 ml tubes have been loaded and PLATE is selected by mistake, the lid pressure may cause the tubes to become crushed or deformed. ▲

7. Accept the changes and start the run by pressing **YES**.

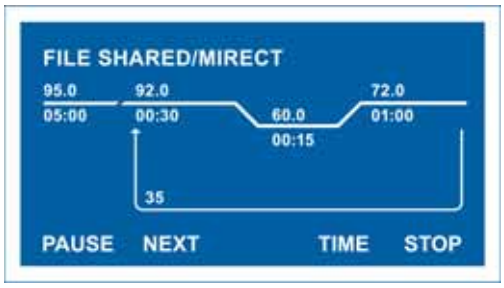
Note When the run begins, the lid will begin to move, a blue LED light will flash, and the running protocol will be displayed in semigraphical or list mode, depending on which has been selected. ▲

Monitoring a run

You can monitor a run in two screens: Status screen and Time status screen.

Status screen

Upon initiation of a run, the Piko Thermal Cycler will display the Status screen.



The current running temperature step in the protocol is represented by a flashing line, and the file name and host folder are displayed on the top of the screen.

To skip to the next temperature step in the protocol, press **NEXT**.

Note Pressing the **TOGGLE** key will switch the display between list mode and semigraphical mode. ▲

Time status screen

You can toggle to the Time status screen by pressing **TIME**.

The Time status screen displays additional information about the run. As with the Status screen, the file name and host folder are displayed on the top of the screen. Additionally, the following status parameters are displayed:

- **STEP** – Displays the step number of the currently running temperature step, as well as the programmed temperature and time of the step.
- **CYCLE** – Displays the current cycle number.
- The large numbers in the middle of the screen display the hours, minutes and seconds remaining until the completion of the running protocol.

To return to the Status screen, press **STAT**.

Functions in the screens

In both screens, you can pause the run on the present temperature step, or the next step if ramping, by pressing **PAUSE**. When paused, this option becomes **RESUME**.

You can stop a run by pressing **STOP**.

You can also return to the **Main** menu for writing or editing protocols while the instrument is running by pressing the **C** key on the keypad.

Note You can return to the Status screen from the **Main** menu screen by pressing **STAT** when a protocol is running. ▲

Chapter 5
Settings

This section describes the different settings of the Piko Thermal Cycler.

Viewing general information about Piko Thermal Cycler

You can view the block type, serial number and the current version of the firmware in the System info menu.

1. In the **Main** menu, press **TOOLS**.
2. Highlight SYSTEM INFO and press **OPEN**.

You will see the instrument type and the serial number on the screen.

Adjusting the contrast of the LCD screen

To adjust the contrast of the Piko Thermal Cycler's LCD screen:

1. In the **Main** menu, press **TOOLS**.
2. Highlight DIAGNOSTICS and press **OPEN**.
3. Highlight DISPLAY and press **OPEN**.

4. Adjust the contrast by pressing the up and down arrow keys from the keypad.

5. Accept the settings by pressing **YES**.

Adjusting the date and time settings

To adjust the date and time:

Note If the Piko Thermal Cycler is unplugged and without power for more than 72 hours, you may have to reset the clock. ▲

1. In the Main menu, press **TOOLS**.

2. Highlight DIAGNOSTICS and press **OPEN**.

3. Highlight CLOCK and press **OPEN**.

4. Press **MOD**.

5. Move to the date field and enter the new date (MM-DD-YYYY) using the keypad.

6. Move to the other fields with the arrow keys and edit the values.

7. Accept the changes by pressing **SAVE**.

Changing the network settings

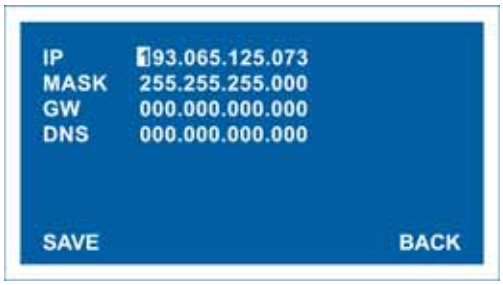
In the Network menu you can change the IP address, the subnet mask (MASK), the gateway (GW), and the Domain Name Server (DNS).

Caution Improper settings can cause problems with the network, so caution should be used when changing the IP address from the default. ▲

1. In the **Main** menu, press **TOOLS**.

2. Highlight NETWORK and press **OPEN**.

3. Scroll to the desired row with arrow keys, and adjust the values.



4. Accept the changes by pressing **SAVE**.

Pressing **BACK** will take you to the **Main** menu without changing the settings.

Service

This function is to be used by authorized Thermo Fisher Scientific service personnel only.

Viewing protocol log files

The system creates a log file for each run protocol as well as for instrument errors. Refer to “Viewing instrument log files” on page 30.

1. In the **Main** menu, press **TOOLS**.

2. Highlight LOGFILES and press **OPEN**.

3. Select PROTOCOL LOGS and press **OPEN**.

4. Select the desired log file in the list and press **OPEN**.

The log file opens displaying the date and starting time of the run, as well as the runtime.

If there were no errors during the run, the screen shows “NO ENTRIES”.

If errors or warnings occurred during the run, the screen shows the number of entries.

a. View the details of the error or warning by pressing **LIST**.

b. See the entries in the protocol file by pressing **FILE**.

c. In the event of an error, see the recommended action by pressing **ACTION**.

5. Quit the log file and PROTOCOL LOGS by pressing **BACK**.

Viewing instrument log files

The instrument log records errors that occur when a program is not running (for example an anomalous sensor reading).

1. In the **Main** menu, press **TOOLS**.

2. Highlight LOGFILES and press **OPEN**.

3. Select INSTRUMENT LOG and press **OPEN**.

4. Select the desired log file and press **OPEN**.

Parking the instrument for shipping or long-term storage

If the instrument is shipped or stored for a longer period, park the instrument according to the following instructions.

Note You will need an empty sample plate for parking the instrument. ▲

1. In the **Main** menu, press **TOOLS**.
2. Highlight PARK INSTRUMENT and press **OPEN**.

3. Insert an empty plate and close the drawer.
4. Press **OK**.

When parking is completed, the following message will be displayed:

5. Press **BACK** to return to the **TOOLS** menu.

Chapter 6
Maintenance

Contact local authorized technical service or your local Thermo Fisher Scientific representative for assistance, if necessary.

Cleaning the Piko Thermal Cycler

Clean the outside of the Piko Thermal Cycler with a damp, soft cloth or tissue whenever something has been spilled on it or the cover is dusty. A mild soap solution may be used if needed.

Clean block wells with swabs moistened with water, 95% ethanol, or a 1:100 dilution of bleach in water.

Disposal of the instrument

If the Piko Thermal Cycler is exposed to potentially infectious biological samples, toxic or corrosive chemicals or radioactive chemicals, waste management of the complete instrument must be carried out to ensure that there is no risk of contamination.

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal.

Dispose of the instrument according to the legislation stipulated by the local authorities concerning take-back of electronic equipment and waste. The proposals for the procedures vary by country.

Pollution degree	2 (see "Safety specifications" on page 36)
Method of disposal	Electronic waste Contaminated waste (Infectious waste)

WEEE symbol Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State (European Country), and this product should be disposed of or recycled through them. Further information on Thermo Fisher Scientific's compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at www.thermo.com/WEEERoHS. ▲

Regarding the original packaging and packing materials, use the recycling operators known to you. For more information, contact your local Thermo Fisher Scientific representative.

Chapter 7
Technical Specifications

Instrument specifications

Thermo Fisher Scientific reserves the right to change any specifications without prior notice as part of our continuous product development program (Table 7–1).

Table 7–1. Instrument specifications

Instrument specifications	
Dimensions	
Size	16 cm wide, 17 cm deep, 23 cm high
Weight	4 kg (includes power supply and cord)
Electrical	
Power supply	200 W, 24 V, 8.33 A
Line voltage	100–240 VAC
Input current	2.5 A and 4.0 A
Frequency	50–60 Hz
Power failure recovery	Yes
Instrument configuration	
Block formats	24-well, 96-well (not interchangeable)
Display	Backlit LCD
Memory	40 folders with 99 programs each
Communication ports	Ethernet, Serial
Programming	
Adjustable ramp rate	Yes
Touchdown	Yes
Typical thermal performance	
Max. ramp rate	> 5°C/s heating, > 4.5°C/s cooling
Thermal uniformity	± 0.3°C
Thermal accuracy	± 0.2°C
Thermal range	4°C to 99.9°C

Safety specifications

In conformity with the requirements

This section describes the safety specifications for the Piko Thermal Cycler instrument.

Piko Thermal Cycler bears the following markings:
Type 5000
CE mark
100–240 Vac, 50/60 Hz
EUT: 24 VDC, 8.33 A
PSU: 100–240 Vac, 50–60 Hz, 2.5 A or 4 A

Piko Thermal Cycler conforms to the following requirements:
2006/42/EC (Machinery Directive)
2006/95/EC (Low Voltage Directive)
2004/108/EC (Electromagnetic Compatibility Directive, EMC)
2002/96/EC (WEEE Directive)

Safety performance:
IEC 61010-1:2001 (Ed. 2), including US and CA National differences

The safety specifications are also met under the following environmental conditions in addition to or in excess of those stated in the operating conditions:	
Altitude	Up to 2000 m
Temperature	+5°C to +40°C
Humidity	Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
Mains supply fluctuations	± 10% from nominal
Installation category (overvoltage category)	II according to IEC 60664-1 (see **Note** 1)
Pollution degree	2 according to IEC 60664-1 (see **Note** 2)

Note 1) The *installation category* (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II which is the category used for instruments in installations supplied from a supply comparable to public mains, such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.

2) The *pollution degree* describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only nonconductive pollution, such as dust, occurs with the exception of occasional conductivity caused by condensation. ▲

EMC performance:	
EN 61000-6-3:2007	Generic standards – Emission standard for residential, commercial and light-industrial environments
EN 61000-6-2:2005	Generic standards – Immunity standard for industrial environment
EN 61326-1:2006	Product family standard – Electrical equipment for measurement, control and laboratory use

Test standards	**Performance limits**
EN 55011:2007+A2:2007	Class B, 150 kHz – 1 GHz, rad., cond.
EN 61000-3-2:2006	Class A
EN 61000-3-3:1995+A1:2001, A2:2005	
EN 61000-4-2:1995+A1:1998, A2:2005	4 kV CD / AD, Criteria C
EN 61000-4-3:2002+A1:2002	10 V/m, 80 MHz – 1 GHz 3 V/m, 1.4–2.7 GHz, Criteria A
EN 61000-4-4:2004	1 kV, 2kV, Criteria B
EN 61000-4-5:2006	0.5 kV, 1kV, 2kV, Criteria B
EN 61000-4-6:2007	10 V_{rms}, 150 kHz – 80 MHz, Criteria A
EN 61000-4-8:1993+A1:2001	30 A/m, Criteria A
EN 61000-4-11:2004	30%/500 ms, Criteria B 60%/100 ms, Criteria B 100%/10 ms, Criteria B 100%/20 ms, Criteria B 100%/5000 ms, Criteria C

Chapter 8
Troubleshooting Guide

Note Do not use the instrument if it appears that it does not function properly. ▲

Error log

In case of an error there are two types of messages the Piko Thermal Cycler may display: warning messages and error messages.

A warning message may be displayed if the system is experiencing difficulty in running a protocol (for example, “Block temperature Too High” or “Lid Temperature Too Low”). In case of a temperature-related warning message, check to ensure that the air vents are not blocked and that the fan is working. A warning message is also displayed if a protocol is altered during a run (for example paused, or if steps are skipped).

If an error message appears in the display window, your Piko Thermal Cycler will abort the protocol and immediately shut down to prevent any damage to the system.

Should you receive an error message or a persistent warning message, contact your local distributor for support.

Error messages

Errors inform you that a fatal event has occurred during the execution of the protocol (Table 8–2). For all errors except E1, the protocol will be stopped and all heating units will be turned off. For the case of a power interruption (E1) the instrument will resume operating as it was, but will display the error message until the user clears it.

Table 8–2. Error codes reported

Code	Error message	Description	Action
E1	POWER FAILURE	This error is set if the power was lost during protocol execution.	Check log files.
E3	BLOCK TEMP.	This error is set if the block temperature is far above normal use limits.	Contact support.
E4	LID TEMP.	This error is set if the lid temperature is far above normal use limits.	Contact support.
E5	SINK TEMP.	This error is set if the heat sink temperature is far above normal use limits.	Ensure that the airflow to the fan is not obstructed. If the problem persists, contact support.

Continued

Cont.

Code	Error message	Description	Action
E11	CALIB. TABLE	This error is set if any calibration temperature is out of the valid range.	Reboot the instrument. If the problem persists, contact support.
E12	SINK TEMP. LOW	This error is set if the sink temperature sets below -20°C. The reason for this can be a broken temperature gauge or a very low device temperature.	Wait for the instrument to reach the operating temp. If the problem persists, contact support.
E13	BLOCK TEMP. LOW	This error is set if the block temperature sets below -20°C. The reason for this can be a broken temperature gauge or a very low device temperature.	Wait for the instrument to reach the operating temp. If the problem persists, contact support.
E14	LID TEMP. LOW	This error is set if the lid temperature sets below -20°C. The reason for this can be a broken temperature gauge or a very low device temperature.	Wait for the instrument to reach the operating temp. If the problem persists, contact support.
E15	BLOCK TEMP. SHIFT	This error is set if consecutive reads of the block temperature differ more than is physically possible.	Reboot the instrument. If the problem persists, contact support.
E17	LID TEMP. SHIFT	This error is set if consecutive reads of the lid temperature differ more than is physically possible.	Reboot the instrument. If the problem persists, contact support.
E18	LID POS. FAILURE	This error is set if the lid hit pressure before it was supposed to. It can be caused by hitting an obstruction.	Retry. If the problem persists, see the manual.
E21	BLOCK TEMP. CHANGE	This error is set if power is applied to the block, but the temperature does not change.	Contact support.
E33	SELF TEST FAILURE	The Piko unit fails self test.	Reboot the instrument. If the problem persists, contact support.
E35	LID TEMP. CHANGE	This error is set if power is applied to the lid, but the temperature does not change.	Contact support.
E36	STRAIN GAUGE FAILURE	This error is set if the measured pressure value is not within valid limits or if the target pressure is not reached in a certain time.	Contact support.
E37	LID OPTO FAILURE	This error is set if the lid was driven up but fails to detect as being fully up within a specified time limit.	Retry. If the problem persists, see the manual.
E40	DRAWER FAILURE	This error is set if the drawer is opened, but the drawer is not detected to be open within a specified time limit.	Contact support.

Warning messages

Warnings inform you that an unwanted event has possibly occurred during the execution of the protocol (Table 8–3). The protocol is not stopped, but the event may have an effect on the results.

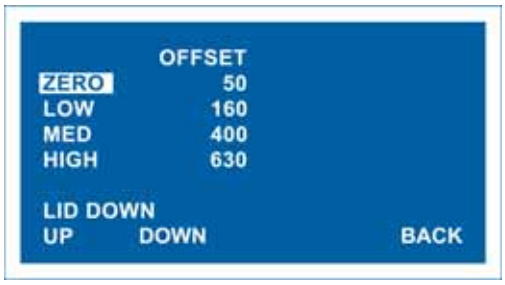
Table 8–3. Warning codes reported

Code	Warning message	Description	Action
W1	POWER FAILURE	This warning is set if there has been a power failure that has lasted less than 24h and the protocol was recovered.	Check the log files.
W8	BLOCK TEMP HIGH	This warning is set if the block temperature is above normal use limits.	
W9	LID TEMP HIGH	This warning is set if the lid temperature is above normal use limits.	
W10	SINK TEMP HIGH	This warning is set if the heat sink temperature is above use normal limits.	Check that the heat sink is clean.
W27	PROTOCOL STOPPED	This warning is set if the protocol is stopped before the end of protocol.	
W29	PROTOCOL PAUSED	This warning is set if the protocol is paused during the protocol run.	Check the log files.
W30	CYCLES ADDED	This warning is set if extra cycles are added to the protocol loop.	Check the log files.
W31	STEP SKIPPED	This warning is set if the protocol step is skipped (the NEXT key was used).	Check the log files.
W32	LID TEMP OVERRIDDEN	This warning is set if the lid temperature is overridden from the service menu.	Check the log files.

Reading the lid offset values

To read the lid offset values:

1. In the **Main** menu, press **TOOLS**.
2. Highlight DIAGNOSTICS and press **OPEN**.
3. Highlight LID and press **OPEN**.
4. Read the LID SETTINGS values.



The LID screen displays the calibration settings for ZERO, LOW, MEDIUM and HIGH lid pressure. The **LID** menu will also periodically display the current location of the lid (UP or DOWN).

Reading the sensor, drawer and lid states

To read the sensor, drawer and lid states:

1. In the **Main** menu, press TOOLS.
2. Highlight DIAGNOSTICS and press OPEN.
3. Highlight SENSORS and press OPEN.

You can view the block, lid and sink temperatures, as well as the drawer and lid states.

Chapter 9
Ordering Information

Contact your local Thermo Fisher Scientific representative for ordering and service information (Table 9–4).

Piko

Table 9–4. Instrument catalog number

Code	Item
TCP0024	Piko Thermal Cycler, 24-well
TCP0096	Piko Thermal Cycler, 96-well

Glossary

PCR Polymerase chain reaction.

touchdown PCR A protocol in which time and/or temperature are changed in small increments and are added or subtracted to each step in a loop. These changes continue to progress from cycle to cycle throughout the entire loop section of the protocol.

UI User interface.

Notes

Notes

Notes

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